

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

TK/KI

PCT

NOTIFICATION OF TRANSMITTAL
OF COPIES OF TRANSLATION
OF THE INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY
(CHAPTER I OR CHAPTER II
OF THE PATENT COOPERATION TREATY)
(PCT Rules 44bis.3(c) and 72.2)

To:

EPPING HERMANN FISCHER
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18. Aug. 2006

Frist:

Date of mailing (day/month/year)

03 August 2006 (03.08.2006)

Applicant's or agent's file reference
P2003,0835WO

IMPORTANT NOTIFICATION

International application No.

PCT/DE2004/002384 ✓

International filing date (day/month/year)

26 October 2004 (26.10.2004) ✓

Applicant

OSRAM OPTO SEMICONDUCTORS GMBH et al ✓

1. Transmittal of the translation to the applicant.



The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter I).



The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter II).

2. Transmittal of the copy of the translation to the designated or elected Offices.

The International Bureau notifies the applicant that copies of that translation have been transmitted to the following designated or elected Offices requiring such translation:

None

The following designated or elected Offices, having waived the requirement for such a transmittal at this time, will receive copies of that translation from the International Bureau only upon their request:

AE, AG, AL, AM, AP, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DK, DM, DZ, EA, EC, EE, EG, EP, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OA, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

3. Reminder regarding translation into (one of) the official language(s) of the elected Office(s).

The applicant is reminded that, where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability (Chapter II).

It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned within the applicable time limit (Rule 74.1). See Volume II of the PCT Applicant's Guide for further details.

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference P2003,0835WO	FOR FURTHER ACTION		See item 4 below
International application No. PCT/DE2004/002384 ✓	International filing date (day/month/year) 26 October 2004 (26.10.2004) ✓	Priority date (day/month/year) 28 November 2003 (28.11.2003) ✓	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant OSRAM OPTO SEMICONDUCTORS GMBH			

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 9 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Box No. I. | Basis of the report |
| <input checked="" type="checkbox"/> Box No. II | Priority |
| <input type="checkbox"/> Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> Box No. VI | Certain documents cited |
| <input type="checkbox"/> Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

Date of issuance of this report
27 July 2006 (27.07.2006)

Authorized officer

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PATENT COOPERATION TREATY

TRANSLATION

PCT

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Applicant's or agent's file reference P2003, 0835WO		Date of mailing (day/month/year)	See form PCT/ISA/210
		FOR FURTHER ACTION See paragraph 2 below	
International application No. PCT/DE2004/002384	International filing date (day/month/year) 26.10.2004	Priority date (day/month/year) 28.11.2003	
International Patent Classification (IPC) or both national classification and IPC H01S5/026, H01L27/15			
Applicant OSRAM OPTO SEMICONDUCTORS GMBH			

1. This opinion contains indications relating to the following items:	
<input checked="" type="checkbox"/>	Box No. I Basis of the opinion
<input checked="" type="checkbox"/>	Box No. II Priority
<input type="checkbox"/>	Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI Certain documents cited
<input type="checkbox"/>	Box No. VII Certain defects in the international application
<input type="checkbox"/>	Box No. VIII Certain observations on the international application
2. FURTHER ACTION	
<p>If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.</p> <p>If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.</p> <p>For further options, see Form PCT/ISA/220.</p>	
3. For further details, see notes to Form PCT/ISA/220.	

Name and mailing address of the ISA/EP	Authorized officer
Facsimile No.	Telephone No.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/DE2004/002384

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language
_____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

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Box No. II

Priority

1. ☒ The following document has not yet been furnished:
- ☒ copy of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(a)).
 - ☐ translation of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(b)).
- Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date in the claimed priority date.
2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/DE2004/002384

Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

1. Statement

Novelty (N)

Claims 1-16

YES

Claims

NO

Inventive step (IS)

Claims 1-16

YES

Claims

NO

Industrial applicability (IA)

Claims 1-16

YES

Claims

NO

2. Citations and explanations:

1. In the present opinion, reference is made to the following documents:

D1: PATENT ABSTRACTS OF JAPAN vol. 1998, no. 12,
31 October 1998 (1998-10-31) & JP 10 200159 A
(ROHM CO LTD), 31 July 1998 (1998-07-31)

D2: PATENT ABSTRACTS OF JAPAN vol. 006, no. 176
(E-130), 10 September 1982 (1982-09-10) &
JP 57 093591 A (HITACHI LTD), 10 June 1982
(1982-06-10)

2. Document D1 (cf. figure 1 and associated description) is regarded as the closest prior art. It discloses (the references between parentheses relate to said document) a

light-emitting semiconductor component (3)
comprising a semiconductor layer sequence (31, 33,
34, 35, 55, 53) produced monolithically,
a region of n-doped semiconductor layers (33) and a
region of p-doped semiconductor layers (35, 55)
succeeding one another, and
a first pn junction (34) being formed between the

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Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

regions (33, 35, 55),
the first pn junction (34) being subdivided into a light-emitting section (3) and a protective diode section (5) by an insulating section,
the insulating section electrically insulating the light-emitting section (3) and the protective diode section (5) from one another in the region of the p-doped semiconductor layers (35, 55), and
the region of the p-doped semiconductor layers (55) is provided with an n-doped semiconductor layer (53) in the protective diode section (5) on the side remote from the first pn junction (34),
which n-doped semiconductor layer forms a second pn junction (55, 53) with the region of p-doped semiconductor layers (55) in the protective diode section (5) and is electrically conductively connected (59-38) to the region of p-doped semiconductor layers (35) in the light-emitting section (3).

3. The subject matter of claim 1 therefore differs from the light-emitting semiconductor component known from D1 by virtue of the fact that

the first pn junction (34) has a larger area in the protective diode section (5) than in the light-emitting section (3).

The subject matter of claim 1 is thus novel (PCT Article 33(2)).

4. The **problem** addressed by the present invention can

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Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

therefore be considered that of specifying a light-emitting semiconductor component which is distinguished by **improved protection against voltage pulses in the reverse direction** of the light-emitting pn junction that are caused by electrostatic discharges.

5. The solution to this problem proposed in claim 1 of the present application involves an **inventive step (PCT Article 33(3)) for the following reasons:**

In D1, the region of p-doped semiconductor layers (55) is electrically conductively connected (58-38) to the region of n-doped semiconductor layers (33) in the protective diode section (5), so that the first pn junction (34) is bridged in the protective diode section (5). Consequently, the npn semiconductor layer sequence (33, 55, 53) in the protective diode section (5) acts as a protective diode that is reverse-connected in parallel with the light-emitting section (3). Therefore, D1 gives no indication of forming the first pn junction (34) - which is ineffective anyway - in the protective diode section (5) on a larger area than in the light-emitting section (3).

D2 (cf. figure 2 and associated description) discloses an npn junction structure connected in parallel with the laser diode and having a faster reaction time than that of the laser diode. However, the arrangement of the laser diode and the npn junction structure as two separate semiconductor

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Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability:
citations and explanations supporting such statement

elements on a common substrate means that achieving a faster reaction time by means of a larger area of the first pn junction is not suggested to a person skilled in the art.

6. Therefore, the prior art does not provide any indications that would prompt a person skilled in the art to embody a light-emitting semiconductor component in the particular manner according to claim 1. The present subject matter of the application can therefore be regarded as **novel and inventive**.
7. Claims 2-15 are dependent on claim 1 and thus likewise meet the PCT requirements for novelty and inventive step.

Observations:

1. Claim 16 has been duly drafted as a claim dependent on claim 1, but its subject matter does not come under that of the preceding claims to which claim 16 is referred directly or indirectly. This contradiction between the claims leads to doubts with regard to the subject matter for which protection is sought, for which reason the claims are not clear (**PCT Article 6**). Claim 16 should therefore have been formulated as a separate independent claim.
2. Claim 1 has been duly drafted in the two-part form, but some features should not have been included in

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Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability:
citations and explanations supporting such statement

the characterizing part since they were disclosed in document D1 in conjunction with the features indicated in the preamble, cf. paragraph 2 above (PCT Rule 6.3(b)).

3. Contrary to PCT Rule 5.1(a)(ii), the description does not cite documents D1 and D2 or indicate the relevant prior art disclosed therein.